COGEH 2018

Presented to the SPEE Annual General Meeting June 5th, 2018

Carlsbad, California

HISTORY OF COGEH

- 1998 – Identified the need
- June 2002 – Volume 1 published
  - *Reserves Definitions and Evaluation Practices and Procedures*
  - ***September 2003 – NI 51-101***
    - *Standards of Disclosure for Oil and Gas Activities (Replacing National Policy No. 2-B)*
- 2005 – Volume 2 published
  - *Detailed Guidelines for Estimation and Classification of Oil and Gas Resources and Reserves*
- September 2007 – Volume 1 Second Edition published
- September 2007 – Volume 3 published
  - *Detailed Guidelines for Estimation and Classification of Coal Bed Methane (CBM) Reserves and Resources*
  - *Reserves Recognition for International Properties*
  - *Detailed Guidelines for Estimation and Classification of Bitumen and Steam Assisted Gravity Drainage (SAGD) Reserves and Resources (Updated October 2013)*
- June 2014 – Resources Other Than Reserves (ROTR) published
  - *Addendum to Volume 2*

2018 COGEH UPDATE TIMELINE

- Fall 2014 – ROTR Wrap up documents
- Spring 2016 – Industry Feedback
- Spring/Summer 2016 – SPEE Calgary sets up Steering Committee
- Fall 2016 – Sub-Committee began editing
- Winter 2017-2018 – Final drafts received from all subcommittees
- Target – Summer 2018

INDUSTRY FEEDBACK – WHO

- Suncor
- Laricina Energy Ltd.
- Athabasca Oil Corporation
- BC Oil & Gas Commission
- Cenovus Energy Inc.
- Sproule Associates Limited
- Alberta Energy Regulator
- GLJ Petroleum Consultants
- Crescent Point Energy Corp.
- Husky Energy
- Evolution Resource SA
- Encana
- SPEE Calgary Membership
- McDaniel & Associates Consultants Ltd.

INDUSTRY FEEDBACK

- Duplication and Inconsistency between volumes
- Information out of date
- Create a Digital document
- Consolidate the documents
- Alignment of definitions of reserves, resources and product types with NI51-101
- Additional guidance on operating costs
- Clarity on the inclusion of Abandonment and Reclamation costs
- Clarity on Type Curve creation
- Typo’s

GOALS AND OBJECTIVES

- COGEH is to be a Guidance document of Industry Best Practices
- Combine existing documents into a single consolidated document
- Use hyperlinks where possible when referring to regulations and/or examples
- Create an “Evergreen” document
- Digitize and update distribution of the materials
- Remove any redundant material

COGEH FORMAT

- COGEH 2018 will be available as an online subscription only
  - Pricing is still being worked out but we believe it will not be too onerous for individuals or corporations.
  - Allows for easy searches of the materials for topics of interest.
  - Allows SPEE Calgary to keep it “evergreen” and users do not need to purchase updates as that will be included in the subscription.
  - Using hyperlinks for some materials allows the information to be up to date.

COGEH 2018 STRUCTURE

1. Introduction and Definitions
2. Estimation of Reserves and Resources
3. Economic Evaluation of Reserves
4. Financial Analysis and Benchmarking Practices
5. Purpose of Evaluations
6. Detailed Guidelines for the Estimation and Classification of Coalbed Methane (CBM) reserves and resources
7. Detailed Guidelines for the Estimation and Classification of Bitumen Reserves and Resources

Nothing has been removed

NEW/UPDATED CONTENT

- Product Types
- Undeveloped Reserve Bookings and Timing
- Type Curve Generation
- Guidance on Operating, Abandonment and Reclamation Costs
- Statistical Methods
- Social and Environmental Considerations

PRODUCT TYPES

Oil:	Light, Medium
	Heavy
	Bitumen
	Synthetic Crude Oil
Natural Gas:	Associated
	Non-Associated
	Coalbed Methane
By-Products:	Ethane
	Propane
	Butanes
	Pentanes Plus (Condensate)
Non-Hydrocarbons:	Sulphur
	Helium

Note: NI 51-101 also includes Gas Hydrates, Shale Gas, Synthetic Gas and Tight Oil

NON-PRODUCING AND UNDEVELOPED RESERVES BOOKING AND TIMING

- Non–Producing reserves: “should normally be put on production within a one to three year period”
- Undeveloped reserves: “development should normally proceed within five years unless there is appropriate justification with adequate explanation”
- Ongoing play development: “it is reasonable to have **proved undeveloped** reserves assigned for **five years of development drilling** and **probable undeveloped** reserves extending out for **ten years of development drilling**”
- Can book longer periods of development under proven and probable for SAGD, Bitumen Mining and Offshore projects where justified. Other types of projects can be considered for extended development scenarios on a case by case basis. These variations should be clearly disclosed in the report.
- Reserve Reports cutoff at 50 years or the end of the lease.

TYPE CURVE GENERATION

2.7 EMPIRICAL TYPE WELL
2.7.1 DATA NORMALIZATION
2.7.1.1 WELLS WITH SUSPENDED MONTHS IN DATA SET
2.7.1.2 INCLUDING SHUT-IN WELLS AND “FAILURES”
2.7.1.3 SAMPLE SIZE CUT-OFF (SURVIVOR BIAS)
2.7.1.4 CALENDAR DAY VERSUS PRODUCING DAY RATES
2.7.1.5 NORMALIZE TO PEAK RATE VERSES MONTH ZERO
2.7.1.6 HISTORY VERSES HISTORY + FORECAST
2.7.1.6.1 FORECASTING THE AVERAGE
2.7.1.6.2 AVERAGING THE FORECASTS
2.7.2 NORMALIZING AND SCALING FOR KEY ATTRIBUTES
2.7.2.1 NORMALIZING TO WELL LENGTH
2.7.2.2 NORMALIZING TO NUMBER OF STAGES
2.7.2.3 NORMALIZING TO PROPPANT LOADING
2.7.3 PROBIT DISTRIBUTIONS
2.7.4 CORRELATION AND CROSS PLOTS
2.7.5 CHOOSING LOW, BEST AND HIGH TYPE WELLS
2.7.6 CONSIDERATIONS WHEN ASSIGNING TYPE WELLS

GUIDANCE ON OPERATING COSTS

Introducing the concept of Active and Inactive costs

- “Active entity and area costs represent those costs which directly burden producing wells including the associated gathering and processing facilities and related disposal and injection facilities.”
- “Inactive entity and area costs represent those costs associated with non-resource bearing lands or inactive wells in an area. In general, in-active entity costs include;
  - mineral lease rentals;
  - shut-in, suspended and capped well operating costs;
  - shut-in operating and gathering systems and related processing facilities; and
  - future abandonment, decommissioning and reclamation liabilities.”
- “inactive costs be forecast separately from active asset costs, to not unduly burden economic production entities. When included in this fashion an appropriate method can be employed to retire these costs over time.“

GUIDANCE ON ABANDONMENT AND RECLAMATION COSTS

- Environmental damage associated with oil and gas development has emerged as a material societal concern and ADR costs are subject to increased scrutiny. Each report must clearly describe the ADR costs:
  - included in the evaluation; and
  - those excluded from the evaluation.
- Partial inclusion of ADR cost liabilities is not considered best practice. Statements regarding ADR costs should address both active and inactive development including but not limited to; producing wells, suspended wells, service wells, gathering systems, facilities and surface land development.
- Further, an estimate of ADR costs included in an asset evaluation must be properly assessed with reliance on those with the requisite expertise. The source of ADR cost estimates must be identified, and a disclaimer must be stipulated by the evaluator.

STATISTICAL METHODS

- Included sections discussing Risk and Uncertainty in Resource Evaluation and Classification
  - Basic statistical concepts
  - Deterministic vs Probabilistic Methods
  - Aggregation of Resource Estimates
    - Portfolio effects, dependencies etc.
  - Aggregation across resource classes

SOCIAL AND ENVIRONMENTAL CONSIDERATIONS

“There is no standard process for the assessment of social and environmental contingencies, but the following steps are recommended:

A. Identify any relevant social and environmental contingencies.
B. Estimate the probability that relevant socio-environmental issues will be resolved and maintained over the life cycle of the project. This will depend on the specifics of an asset or project and the legal, regulatory and social environment in which it is proposed to be carried out. Although qualitative and subjective, it should be based as much as possible on a documented analysis. In many cases, there will be a history of similar project developments that can be used as analogues.
C. Consider the status of the efforts being made to resolve socio-environmental issues. The level of effort and engagement required will depend on the project.
D. Provide appropriate explanation in a report.”

WHERE IS COGEH UPDATE TODAY?

- Copies have been sent to:
  - SPEE Calgary Review Committee
  - ASC
  - SPEE Reserves Committee
- Sections on Type Curves have been sent to the Monograph 5 committee for their comments
- Comment Period closes on May 22
- Technical Editing is running concurrently with the review

ACKNOWLEDGEMENT OF SUB-COMMITTEE MEMBERS

- David Elliott, Former ASC
- Peter Joziasse, Cenovus
- Phil Welch, McDaniel
- Keith Braaten, GLJ
- Dave Perrott, Suncor
- Nora Stewart, Sproule
- Rob Warholm, Sproule
- Doug Wright, Strategic Oil & Gas Ltd.
- Sandeep Solanki, Laricina Energy Ltd
- Kevin Hanson, Encana
- Richard Leslie, Husky Energy
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- Andi Polanski, Flotek Industries
- Jim Jenkins, AER
- Floyd Williams
- Jason Pacholko, Independent Consultant
- Shannon Scott, McDaniel
- Dave Haugen, Ryder Scott
- Blair Best, McDaniel
- Wes Feik, McDaniel
- Jared Wynveen, McDaniel
- Tim Smith, CPC Resources
- Chad Lemke, GLJ
- Tyler Schloser

QUESTIONS

WHO AM I?

Douglas M Wright P.Eng, MBA

- Past Chairman, Calgary Branch, Society of Petroleum Evaluation Engineers
- Chair, Canadian Oil and Gas Evaluation Handbook Update
- Formerly at Strategic Oil & Gas, Perpetual Energy, Anadarko Canada, ConocoPhillips Canada, Imperial Oil, Texaco Canada and others